

REMARKS

The Applicants thank the Examiner for his thorough examination for the present application and the indication that claim 6 would be allowable if rewritten in independent form.

In sections 1-2 of the Office Action, the Examiner rejects claim 1 under 35 USC 102(e) as being anticipated by Dunne et al. (US Patent No. 6,207,583). Moreover, in section 3, claim 4 is rejected under 35 USC 102(e) as being anticipated by Dunne et al. In section 5, claims 2 and 5 are rejected under 35 USC 103(a) as being unpatentable over Dunne et al. in view of Wang et al. (US Patent No. 6,291,887). In section 6, claims 3 and 7 are rejected under 35 USC 103(a) as being unpatentable over Dunne et al. in view of Liu et al. (US Patent No. 5,972,773). In section 7, claim 8 is rejected under 35 USC 103(a) as being unpatentable over Dunne et al. in view of Hsiao et al. (US Patent No. 5,985,765). These rejections are respectfully traversed.

The combination of Dunne et al., Wang et al., Liu et al. and Hsiao et al., standing alone or in combination, fails to disclose, teach or suggest, inter alia, the following features of the claimed invention:

Claim 1: "forming a victim layer on the surface of the photoresist according to the photoresist topography, wherein the thickness of the victim layer is smaller than that of the photoresist, such that a plurality of slopes are formed on the sidewalls of the photoresist" and

the slopes to be the etching mask.

Claim 4: "forming a victim layer on the surface of the photoresist according to the photoresist topography, wherein the thickness of the victim layer is smaller than that of the photoresist with patterns, such that a plurality of slopes are formed on the sidewalls of the photoresist"; and

"etching the protecting layer to form a plurality of metal contacting windows using the photoresist and the victim layer with the slopes to be the etching mask".

Dunne et al. discloses an etch process for the removal of photoresist residues present on a dielectric sack and on the inside walls of microvias formed in a dielectric layer on a semiconductor substrate. The objective of Dunne et al. is quite different from that of present application, which is to etch a mask layer to act as a protecting layer for metal contact windows using a victim layer with slopes to avoid undercutting (page 3, lines 14-16).

Dunne et al. nowhere mentions a **victim layer** and such a layer is **not necessary** in Dunne et al.'s semiconductor structure, because Dunne et al. does not concern avoiding undercutting. Thus, there is **no motivation** to form a victim layer. Similarly, Dunne et al. nowhere mentions a plurality of **slopes** formed on the sidewalls of the photoresist and it is not necessary in Dunne et al. to have such slopes because undercutting is not a problem in Dunne et al.'s structure. In the present application, however, the victim layer and the slopes are two key features (see the abstract).

photoresist crust 43 in Dunne et al. as the victim layer. Further, the

Examiner asserts that Fig. 5(b) of Dunne et al. shows a plurality of slopes formed on the sidewalls of the patterned photoresist 42. The Applicants respectfully disagree.

In Dunne et al., the photoresist crust 43 is created when the top and sides of photoresist layer 42 is exposed to the energetic etching ions (see col. 8, lines 19-21 and 46-47). The crust 43 is not a "victim layer" **intentionally** formed to avoid undercutting. Rather, the crust is an **unwanted** byproduct during the plasma ashing of the photoresist. There is no similarity at all between a victim layer and photoresist crust.

Further, there is no slope formed on the sidewalls of the patterned photoresist 42 in Dunne et al. A "slope" is something that gradually inclines from the top to the bottom. In Dunne et al., the crust (as shown in Fig. 5(b), for example) does not have a slope because there is no inclination, curve, or slant angle at all.

Moreover, in section 6 of the Office Action, the Examiner asserts that it would have been obvious to modify Dunne's method by forming a victim layer having a thickness as per Liu because according to Liu a thickness of a thin layer, applied over the masking layer, is preferably about 100-1000 Angstroms (col. 5, lines 41-50). This does not make sense because (i) the crust 43 in Dunne et al. is an unwanted byproduct not intentionally formed; and (ii) the low temperature oxide layer in Liu et al. is totally different from the crust 43 in Dunne et al. Thus the fact that the low temperature oxide layer has a thickness of about 100-1000 Angstroms does not make the thickness of the crust 43.

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MPEP 2131 states that a "claim is anticipated only if **each and every element** as set forth in the claim is found, either expressly or inherently described, in a single prior art reference," quoting *Verdegaal Bros v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). Under MPEP 2143, to establish a prima facie case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

Since Dunne et al. does not teach the victim layer with slopes as recited in claims 1 and 4 of the present application, and the Examiner does not show that any other references teach such features, the Applicants believe that claims 1 and 4 are patentable. Claims 2-3 and 9 are also patentable, at least by virtue of their dependency from claim 1. Claims 5-8 and 10 are patentable, at least by virtue of their dependency from claim 4.

The Applicants have attempted to address all of the issues raised by the Examiner in the Office Action as the Applicants understand them. The Applicants believe that the Application is now in condition for allowance. If any point requires further explanation, the Examiner is invited to telephone Troy Cai at (323) 934-2300 or e-mail Troy Cai at tcgai@ladasparry.com.

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Examiner Lan Vinh
Response

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